STRUCTURE AND METHOD FOR FABRICATING SEMICONDUCTOR STRUCTURES AND DEVICES WITH OPTICAL PROCESSING LAYERS UTILIZING THE FORMATION OF A COMPLIANT SUBSTRATE FOR MATERIALS USED TO FORM THE SAME

Abstract of the Disclosure

High quality epitaxial layers of monocrystalline materials can be grown overlying monocrystalline substrates such as large silicon wafers by forming a compliant substrate for growing the monocrystalline layers. An accommodating buffer layer comprises a layer of monocrystalline oxide spaced apart from the silicon wafer by an amorphous interface layer of silicon oxide. The amorphous interface layer dissipates strain and permits the growth of a high quality monocrystalline oxide accommodating buffer layer. The accommodating buffer layer is lattice matched to both the underlying silicon wafer and the overlying monocrystalline material layer. Any lattice mismatch between the accommodating buffer layer and the underlying silicon substrate is taken care of by the amorphous interface layer. Optical processing layers can be placed on monocrystalline layers to process photons produced in the monocrystalline layers.